



Research and Engineering Information Available to the War Fighter

Mr. Alan Shaffer

Director, Plans & Programs, ODDR&E

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Revolutionary Advances



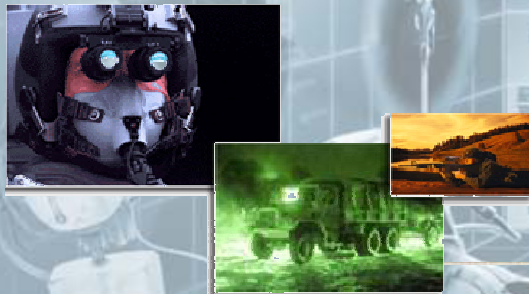
***Adaptive Optics
and Lasers***



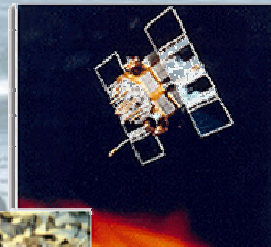
Stealth



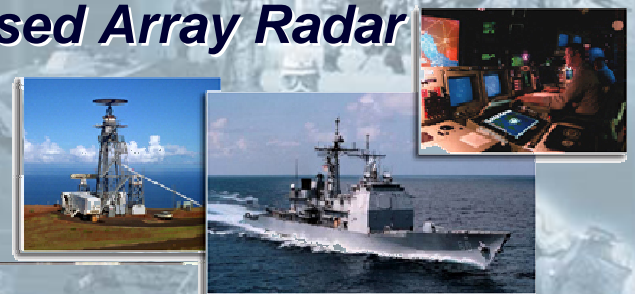
Night Vision



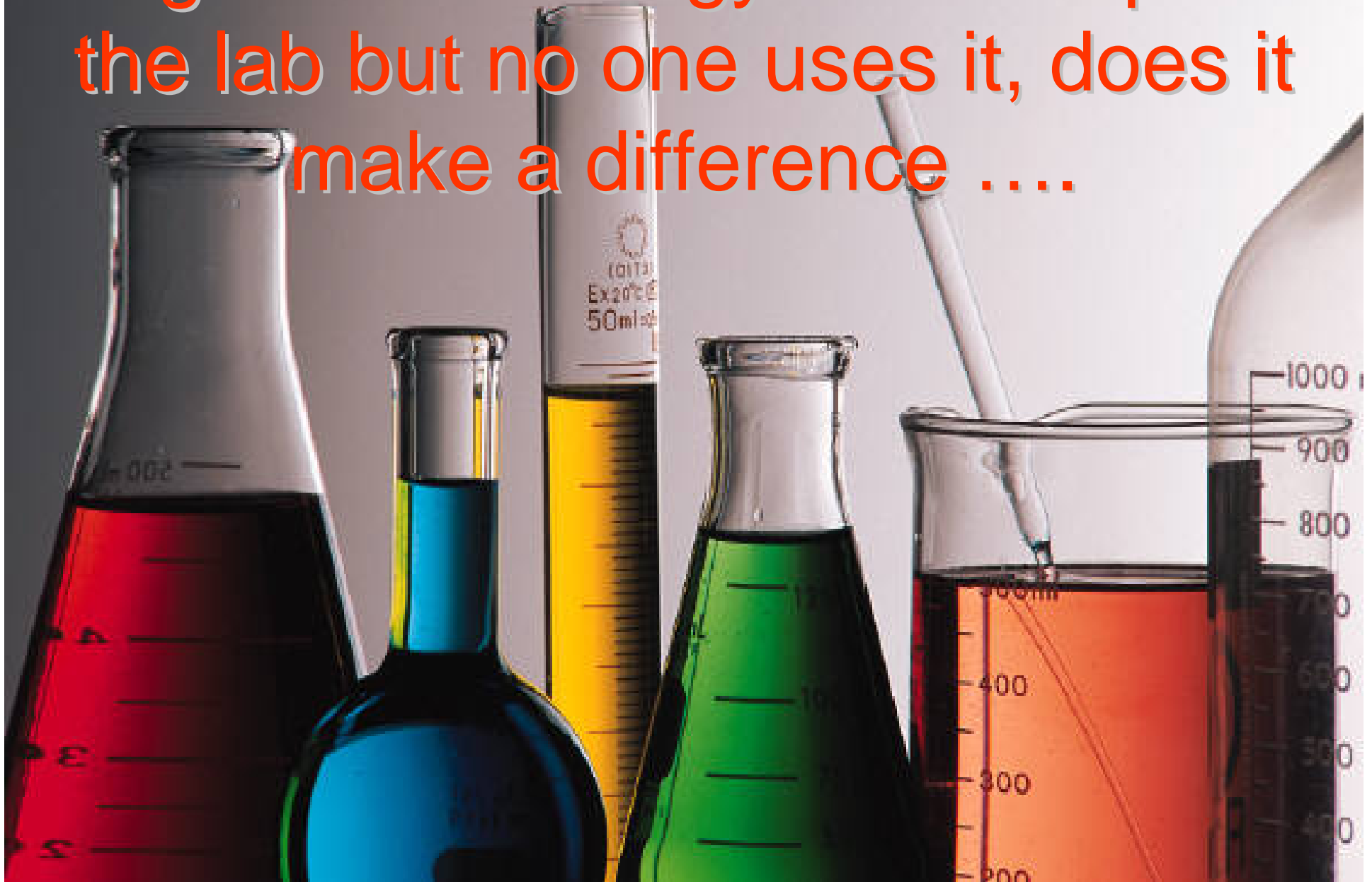
GPS



Phased Array Radar



If a great technology is developed in the lab but no one uses it, does it make a difference





Some Additional Thoughts

- **“If you want to make enemies, try to change something.” (Woodrow Wilson)**
- **“I think there is a world market for maybe five computers.” (Thomas Watson, IBM Chairman, 1943)**
- **“640K ought to be enough for anybody.” (Bill Gates, CEO of Microsoft, 1981)**
- **“Airplanes are interesting toys but of no military value.” (Marechal Ferdinand Foch, Professor of Strategy, Ecole Superieure de Guerre, 1904)**
- **“It is tough to make predictions, especially about the future.” (Yogi Berra)**

An Uncertain World



- **Intellectual Capital Balance - Globalization of Science and Technology**
- **A Quick Look at Disruptive Technologies**
- **How DTIC Can Help?**



The Globalization of S&T

"In 2001, India graduated almost a million more students from college than the United States did. China graduates twice as many students with bachelor's degrees as the U.S., and they have six times as many graduates majoring in engineering. In the international competition to have the biggest and best supply of knowledge workers, America is falling behind."

--"The World is Flat", Friedman, 2005

China's Gross Domestic Product is now 2nd in the world to the U.S.

For the first time ever, all members of China's Politburo Standing Committee, the highest tier within the Communist Party, are card-carrying engineers.

China had 15 companies on Forbes Global 500 list in 2004, up by 4 from the 2003 rankings.

India had only 1 company on the Global 500 in 2003. In 2004, there are 4 Indian companies.

IBM Global Services India unveiled its global delivery centre in Hyderabad on June 14, 2005, the fifth IBM center in India.

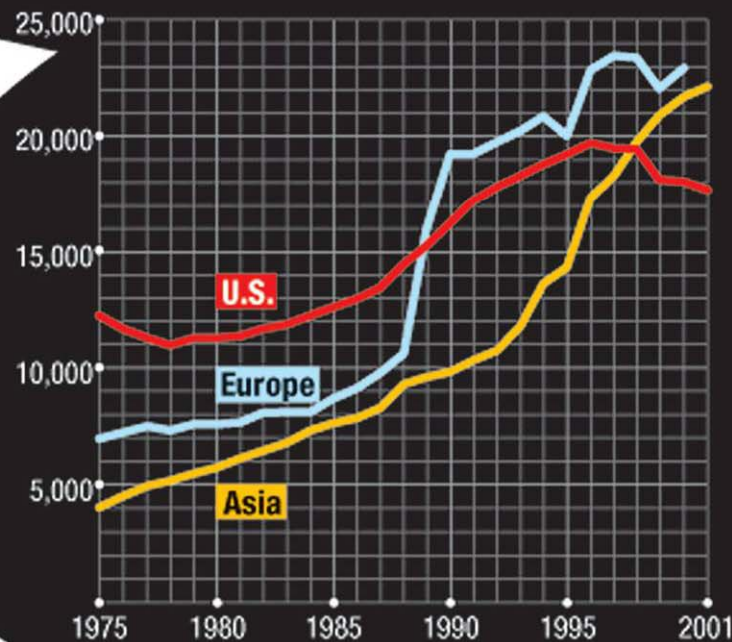
"The last 25 years in technology have just been 'the warm-up act.' Now we are going into the main event, and by the main event, I mean an era in which technology will truly transform every aspect of business, of government, of society, of life."

Carly Fiorina, ex-Hewlett-Packard CEO
2004

Comparison of Scientists & Engineers (S&Es)



PH.D.'s AWARDED IN SCIENCE AND ENGINEERING



An Uncertain World



- **Intellectual Capital Balance - Globalization of Science and Technology**
- **A Quick Look at Disruptive Technologies**
- **How DTIC Can Help?**

Disruptive Technology

A Case Study



- **Digital Equipment Corporation:**
 - 1957 -- Founded
 - 1960 -- Programmable Data Processor 1 (PDP-1) Introduced
 - World's First Minicomputer
 - 10% cost of Mainframe Computers
 - 1965 -- PDP-8 Rolled-out; World's #1 Selling Computer
 - 1970's – 1990—DEC #2 International Computer Sales
 - 1990 -- 120,000 Employees; Revenues \$14B
 - 1998 – Company Bought by Compaq—and Dead



“It was the sudden demise of DEC that first drew my attention. How could a company, once described by Business Week as a freight train that obliterates all competitors, fall so precipitously?” Interview with Clayton Christensen, Harvard Business School on Line, April 1999

The Pace of Technology Development



“Moore’s Law” → Computing doubles every 18 months

“Fiber Law” → Communication capacity doubles every 9 months

“Storage Law” → Storage doubles every 12 months

Defense Acquisition Pace

F-22	Milestone I:	Oct 86	IOC:	Jun 06*
Comanche	Milestone I:	Jun 89	IOC:	Sep 09

* Computers at IOC are 512 X faster, hold 65,000 X bits of information than they did at MS I

Technology growth is non-linear...
Acquisition path has been linear

Enhancing Technology Transition is Changing the Management Model

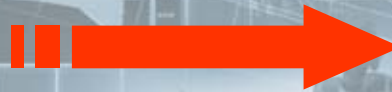


All Services are moving their acquisition processes

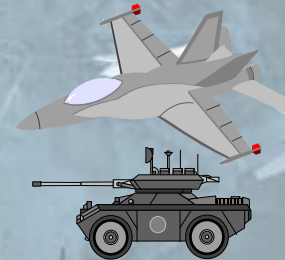
FROM



S&T



Acq



TO

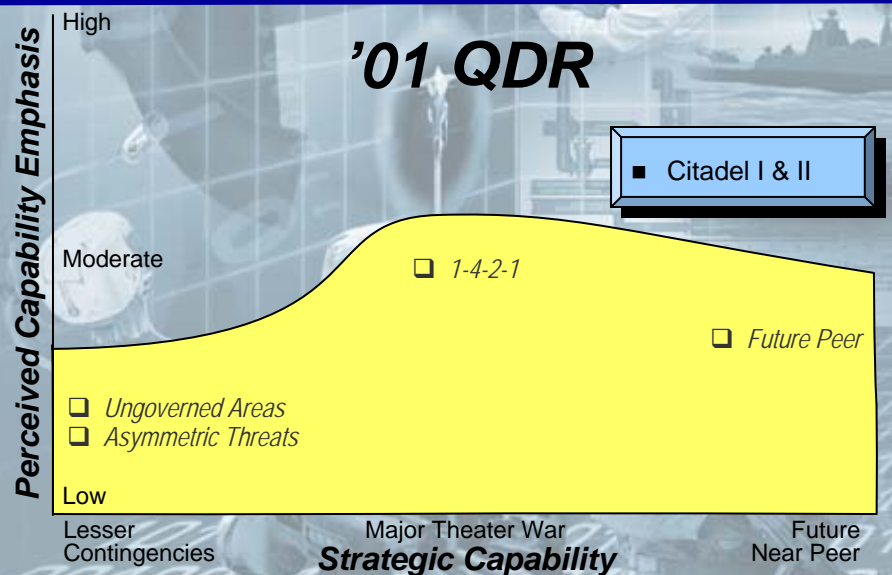
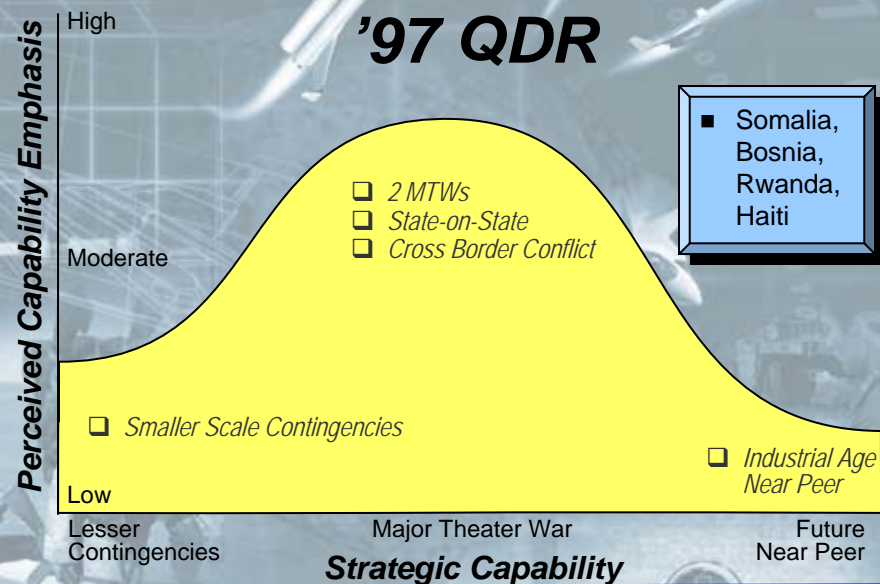
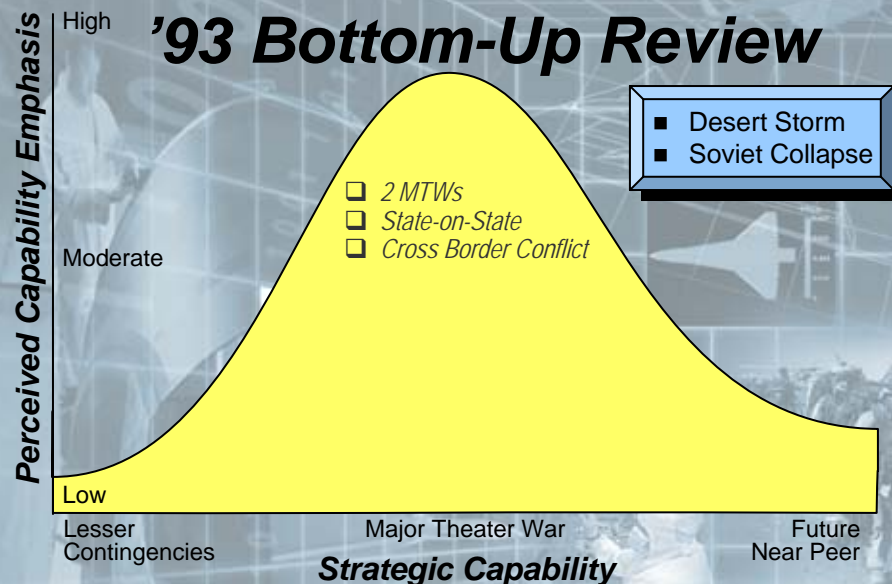
S&T

Acq

**Operational
Requirements
(Warfighter)**

*Developing
the Right
Technology is
a Contact
Sport*

Decade of Strategic Evolution





Recognition of Disruptive Threats

“...as a matter of common sense and self-defense, America will act against such emerging threats before they are fully formed. We cannot defend America and our friends by hoping for the best. So we must be prepared to defeat our enemies’ plans, using the best intelligence and proceeding with deliberation. History will judge harshly those who saw this coming danger but failed to act. In the new world we have entered, the only path to peace and security is the path of action.”

The National Security Strategy of the United States (September 2002)

“This strategy calls for continuing to reorient the Department’s capabilities to address a wider range of challenges. Although U.S. military forces maintain predominance in traditional warfare, they must also improve their ability to address non-traditional challenges. These include...disruptive threats to the United States’ ability to maintain its qualitative edge and ability to project power.”

Quadrennial Defense Review 2006

Definition of Disruptive Technology

The Textbook Definition



- Coined by Clayton Christensen* to describe a new, lower-performance (but cheaper) new product that can be improved more rapidly, so that performance outpaces the product it is replacing
- Key concepts:
 - Greater performance than previous product
 - Replaces (drives) old product out of market

* *"The Innovator's Dilemma"*, 1997

Disruptive Technology

The Non-Textbook Definition



- **Rapid evolution from old, stable technology to new, dominating technology**
- **A technology surprise that gives a competitor an advantage**
 - **Business - Technology that overturns market**
 - **Military - Technology that causes a fundamental change in force structure, basing, and capability balance**
- **Disruptive Technologies can be intended or unintended - but both represent change**
- **Disruptive Technologies may arise from systems or enabling technology**

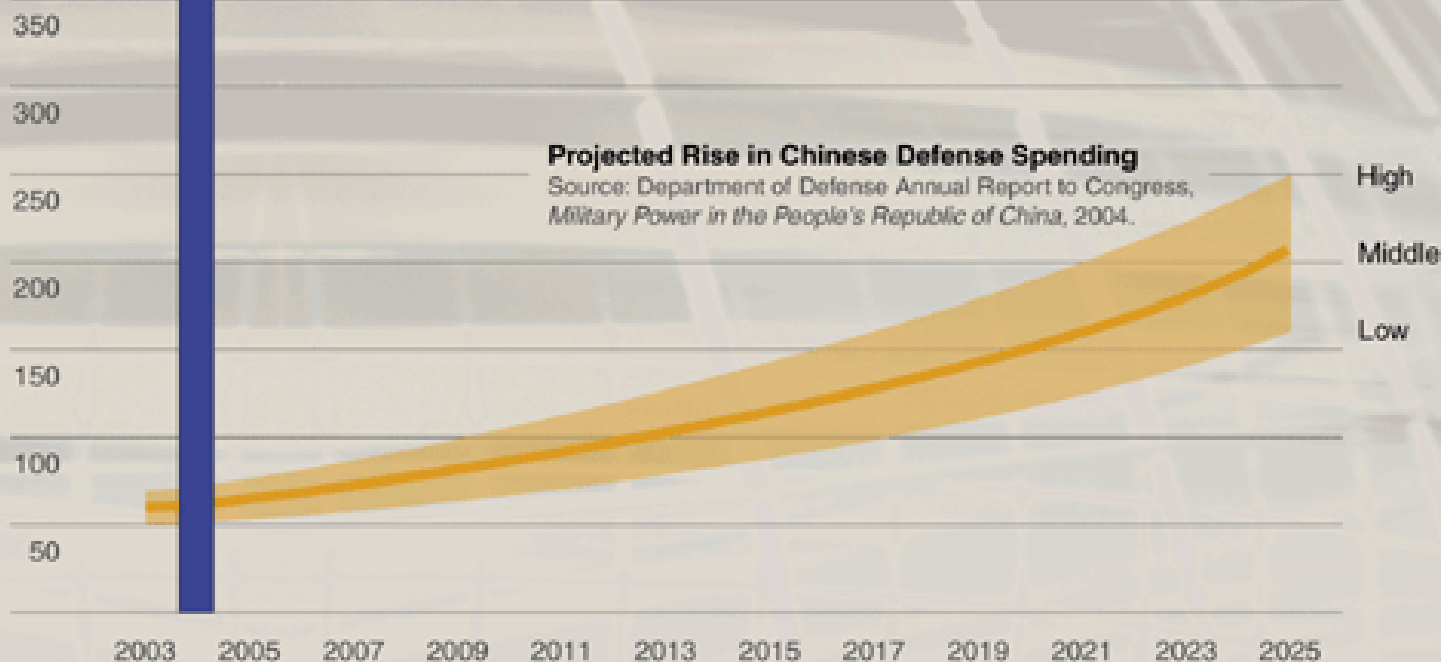
Rising Powers: The Changing Geopolitical Landscape



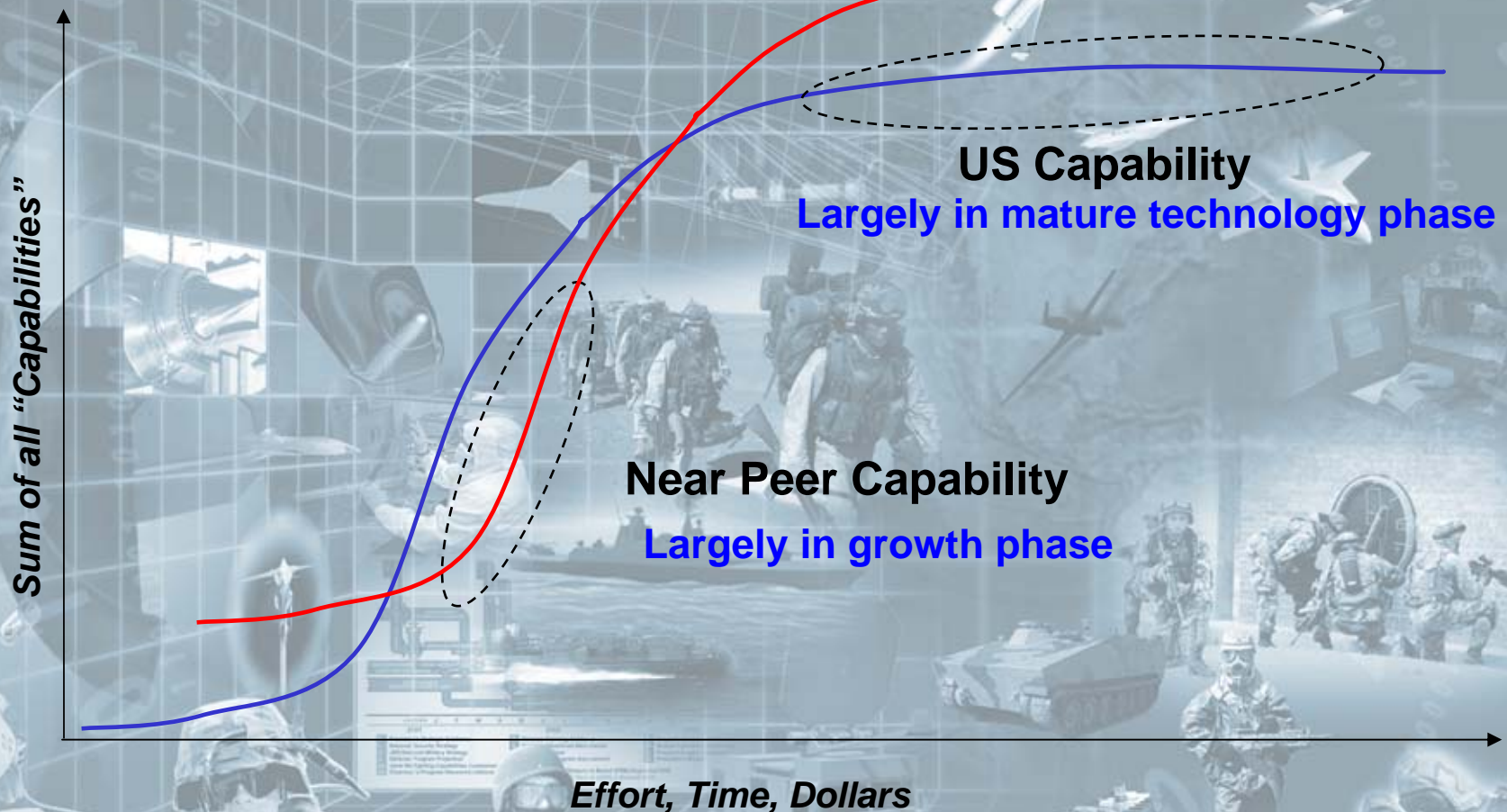
Projected Rise in Chinese Defense Spending, 2003-2025

Billion 2003 dollars

US FY 2004 Defense Budget
Source: Department of Defense



Notional Capability Comparison



ASSERTION: Without changing the US investment profile, US could spend more yet have capability gap close



Trends

- International Science and Technology
- Globalization
- Intellectual Capital Advantage of the US
- Pace of Technology Development
- Types of Combat Operations
- Disruptive Technology

Net Equation—

Uncertainty Increasing

Intellectual Advantage of US Waning



Technical Information Matters

- **Easy access to R&E information for all communities**
- **US and Coalition Warfighting is Technical business**
- **Timescale on getting the answers to operation and technical questions is increasingly shorter**
- **Re-engineering DTIC to be more responsive to broader constituents**



Re-engineering DTIC

- **Defense Technical Information Center (DTIC) established as a DoD Field Activity, June 2004**
 - Aligned under the Under Secretary of Defense for Acquisition, Technology and Logistics (AT&L)
 - Reports to the Director, DDR&E
- **Goals for DTIC**
 - Closely align technology performers (labs, product centers, non-DoD research organizations, etc.) with the scientific and technical information providers at DTIC.
 - Facilitate an enhancement of DTIC efforts to support the USD(AT&L) "E-Business" initiatives in research and engineering.
 - Promote the exploitation of emerging information technology tools on dynamic science and technology databases.
 - Expand on the synergy of research and engineering facilities, people, and information

DTIC Splash Page



DTIC
Science and Technology

DoD Wide
Science and Technology
Web Sites

DoD
Web Sites

[Link to Other Search Engines](#)

[Link to Federated Search](#)

Can't find a particular site in the results? [Click here to submit your site.](#)

or the Warfighter – Register now for the 2006 DTIC Conference, April 3-5, Alexandria, Virginia – [Click here to](#)



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DoD R&E Portal

Easy access to R&E Information



Interaction

Analysis

Dissemination

Retrieval

Collaboration

Collection

Wisdom

Knowledge

Information

Data



R&E Portal

- Initiated in 2004 in response to request from DDR&E for an “information transformation”
- Goal - A single site to allow every DoD researcher, acquisition professional, tester, and operator to find, from their desktop computer:
 - What DoD is doing in R&E
 - Why we are doing the work
 - When the work will be done
 - Who knows more about this information
- Launched in April 2005

DoD R&E Portal



R&E PORTAL

DoD Research & Engineering

[Portal Home](#) [R&E News](#) [DDR&E Initiatives](#) [E-Gov Initiative](#) [Financial Management](#) [S&T Planning Docs & Reports](#) [R&E Communities](#)

R&E Portal Updates

The Quadriennial Defense Review (QDR) is available on [Defenselink](#). To view the document go to <http://www.dod.mil/qdr/>.

The [Defense Technology Search](#) now includes new libraries for the DTIC Research Summaries and the consolidated data from the E-Gov 2005 Data Call. Also added recently are libraries for the DTIC Technical Reports (TR), the Total Electronic Migration System (TEMS), and the Independent Research & Development (IR&D) database (restricted to DoD only).

2006 TARA Guidance documents are now available at the bottom of the [S&T Comp Review](#) page under S&T Planning Docs and Reports.

R&E Portal Feedback

We are soliciting feedback on the R&E Portal from our users to help it better suit your needs. Please go to this [comment card](#) and let us know what you think about the R&E Portal.

DefenseLink Top News



RE-ENLISTMENT – Vice President Richard B. Cheney, and 375th Air Wing Commander Col. Raymond Rottman, perform a mass re-enlistment at Scott Air Force Base, Ill., March 21. U.S. Air Force photo by Mary Lynchard. [Story](#) | [More Photos](#) | [Lead Photo Archive](#)

Bush: Iraq Reaches Historic Moment
WASHINGTON, March 21, 2006 – Sectarian violence that erupted after the Feb. 22 bombing of a mosque in Samarra, Iraq, could have led to civil war. But Iraqis stayed united and are working to build a united government, President Bush said here today. [Story](#)
• [Supporting Troops Helps Promote Freedom](#)

Cheney Thanks Airmen for Terror War Support
SCOTT AIR FORCE BASE, Ill., March 21, 2006 – Vice President Richard B. Cheney visited the U.S. military's transportation hub here today to thank U.S. troops for their support in the global war on terror and assure them that the country won't abandon Iraq before the mission is completed. [Story](#) | [Remarks](#)

Pace Tours Earthquake-Ravaged Pakistan
MUZAFFARABAD, Pakistan, March 21, 2006 – The U.S. chairman of the Joint Chiefs of Staff today had nothing but praise for Pakistani leaders who

Go to the DDR&E Website

[Search DTS](#) [Search Science.gov](#) [Search Firstgov.gov](#) [Search DDR&E](#) [Search DoD-Wide](#)

[Enter the](#) [DEFENSE TECHNOLOGY Search](#)

Search digital libraries of comprehensive reports and data on DoD planned and completed R&E efforts.

When prompted use your R&E Portal username and password. This will persist until change your password or it expires. If your user password has changed since the you logged into the Defense Technology Search, click [here](#) to reset your password

R&E Applications

- [Biomedical Research Database](#)
- [Congressional Budget Queries](#)
- [DDR&E Applications Feedback Form](#)
- [Defense Science & Technology Planning](#)
- [Defense Technology Search](#)
- [IAC TEMS](#)
- [In-House S&T Activities Report](#)
- [Lab Demographics](#)
- [Militarily Critical Technologies List \(Restricted\)](#)
- [Private STINET](#)
- [RDT&E Budget Resource Queries](#)
- [Virtual Technology Expo](#)

R&E Links

- [AFIS Early Bird](#)
- [Advanced Concepts Technology Demonstrations](#)
- [Air Force Office of Scientific Research](#)
- [Army Research Office](#)
- [DefenseLink](#)
- [DefenseLink List of DoD Sites](#)
- [Defense Advanced Research Projects Agency](#)
- [Defense Technical Information Center](#)
- [DoD TechMatch](#)
- [Militarily Critical Technologies List](#)
- [Office of Technology Transition](#)
- [Office of Naval Research](#)
- [OSUD \(AT&L\)](#)
- [OSD Comparative Testing Office \(CTO\)](#)

A Guide Through The Portal

R&E News

Editors' Picks delivers news handpicked by editorial experts in these predefined topics: National Aerospace Initiative, Surveillance, Energy, and Unmanned Vehicles

[R&E News](#) [DDR&E Initiatives](#)

[Announcements](#) [Calendar](#) [Forums](#) [Files](#) [Feedback](#) [Help](#)



R&E Portal

- Provides single-point access to:
 - All current R&E electronic information
 - Includes all DTIC technical data resources (eg, STINET collection)
 - Includes Defense Science & Technology Planning Documents
 - Includes DDR&E financial databases (Congressional Budget Queries)
 - Include other DDR&E resources (eg, MCTL,
 - E-Gov database of information collected on all 6.1-6.3 programs per Public Law 107-347
 - R&E Points of Contact
 - News Service – *2,300 news sources on 25 S&T topics*
 - DDR&E general information
 - Links to useful sites
 - DoD-wide search of all public .mil websites
- Provides intelligent search capability of structured libraries
- Has Single sign-on capability (one password, multi-level security)
- Customer base: DoD R&E community (civil service, military, approved contractors)

Information Available via the R&E Portal



DDR&E Planning Information

Joint Warfighting S&T Plan
Defense Technology Area Plan
Defense Technology Objectives
Basic Research Plan

Dialog NewsEdge

S&T "Early Bird"

Articles updated from 2300
news sources on 25 S&T
topics

Congressional Budget Queries

PBR, R-2s, Congressional
marks and reports for all
6.1-6.7 funding lines

E-government Database

*Information collected on
all 6.1-6.3 programs
per Public Law 107-347*

DTIC Collections

Technical Reports
Research Summaries
Virtual Technology Expo
Biomedical Research Database
In-House S&T Report

Defense Technology Search

*Ability to "smart search" all Portal
information*

***R&E Forums,
Calendars, Files,
Announcements***

R&E Portal



Search
DTIS

Search
Science.gov

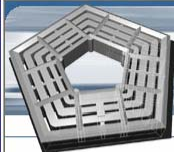
Search
Firstgov.gov

Search
DDR&E

Search
DoD-Wide

Enter the

DEFENSE TECHNOLOGY
Search



Defense Science & Technology Planning

DTOs DTAP JWSTP S&T Strategy BRP Related Info.

The Defense Science and Technology Planning (DSTP) site provides the latest Defense S&T planning documents describing key technology areas and programs funded by the DoD.



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Questions, comments and suggestions improvement are welcome by dstp_help@dtic.mil

DTIC Sponsored IACs

AMPTIAC
CBAC
CPIAC
DACS
IATAC
MTIAC
NTIAC
RAC
SENSIAC
SURVIAC
WSTIAC

Private Stinet
Change Password
About TEMS



Start Searching

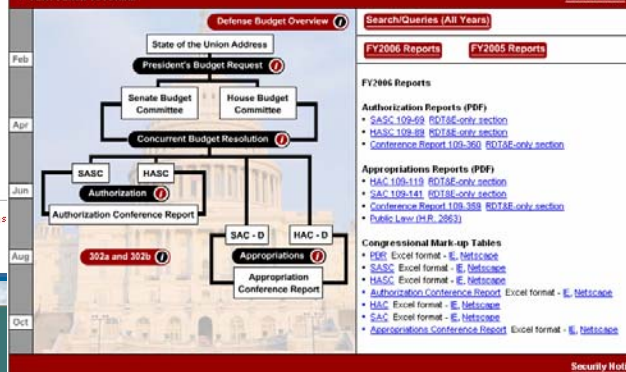
Please Direct Questions to:
Defense Technical Information Center
IAC Program Management Office
Email: tems@dtic.mil
Phone: (703) 767-9120

[Privacy Statement](#)

Congressional Query Site Presidential Budget Request (PBR) Process

PLAY FLASH TUTORIAL

Related Links



Search/Queries (All Years)

FY2006 Reports

FY2005 Reports

FY2006 Reports

Authorization Reports (PDF)
• SASC 109-69 RDT&E-only section
• HASC 109-89 RDT&E-only section
• Conference Report 109-360 RDT&E-only section

Appropriations Reports (PDF)

• HAC 109-119 RDT&E-only section
• SAC 109-141 RDT&E-only section
• Conference Report 109-359 RDT&E-only section
• Public Law (H.R. 2663)

Congressional Markup Tables

• SASC Excel format - E, Netscape
• SASC Excel format - E, Netscape
• HASC Excel format - E, Netscape
• Authorization Conference Report Excel format - E, Netscape
• HAC Excel format - E, Netscape
• SAC Excel format - E, Netscape
• Appropriations Conference Report Excel format - E, Netscape

Security Notice

DoD Web Sites

Search a wide collection of defense websites in multiple domains. This includes many defense agencies, unified commands, the military services - Army, Navy, Air Force, Marine Corps - and other elements of the defense and military establishments.

Search Advanced

Products

Click boxes below to narrow search to select products (default is all boxes selected).

- ☐ DoD Agencies
 - ☐ DoD Agencies News
 - ☐ DefenseLink (www.defenselink.mil)
 - ☐ DefendAmerica (www.defendamerica.mil)
- ☐ Army
- ☐ Navy
- ☐ Air Force
- ☐ Marines
- ☐ Coast Guard



Private STINET
(Scientific & Technical Information Network)

Home Collections Find It Contact Us Help

About STINET

What's New

DTIC Collections

Special Collections

Other Tech Reports

Journals

Other Resources

Ordering from DTIC

Change Password

MCTL

MultiSearch

Handbook for Users

Trouble Downloading

The Defense Technical Information Center (DTIC)'s Scientific and Technical Information Network (STINET) Service helps the DoD community access pertinent scientific and technical information to meet mission needs effectively.

Perform a simple search of DTIC's primary collections:

☒ -Technical Reports [Quick Search](#) [Guided Search](#) [Advanced Search](#)

☐ -Research Summaries [Quick Search](#) [Guided Search](#) [Advanced Search](#)

☐ -IR&D [Quick Search](#) [Guided Search](#) [Advanced Search](#)

"PROPRIETARY"

Search for :

[Search](#) [Clear Query](#) [Search Help](#)

Private STINET consists of the following:



Support to Combatant Commanders



- **What can the R&E Portal do for you?**
 - **Information analyses**
 - **Analytical tools**
 - **News Sources**
 - **Links**
 - **SIPRNET products and tools**

Information available to Combatant Commanders



- **Who is working on X technology?**
- **When will it be completed?**
- **What capability does it enable?**
- **What is planned for the future?**
- **Who can I talk to for further information?**

Planned Enhancements to the R&E Portal



- **Content**
 - Personalization
 - Expanded R&E POC search
 - Additional news sources
 - Additional links
 - Focus on Services/Agencies
- **Advanced Tools**
 - Online “Ask and Expert” reference desk
 - Analytical tools
 - Data Visualization tools
 - Query and data analysis request options

IAC support to Combatant Commanders



- **JFCOM**
 - Provides input and technical analysis to concept development, capabilities, and requirements for the improvement of Joint Urban Operation (JUO) training
 - Coordinates the integration of Combatant Command, Service, Multinational, and Interagency roles in JUO training
- **USSTRATCOM**
 - Responds to a STATCOM request for support for their new Combating WMD mission
 - Provides technical, analytical, and planning support to address issues related to the mission of USSTRATCOM
- **USNORTHCOM**
 - Enhances CBD and Homeland Security technical training for senior level NORTHCOM staff
 - Creates Information Exchange Brokers (IEBs) and three web portals to support information

IAC support to Combatant Commanders



- **USSOUTHCOM**
 - Conducts research and provided analytical support for operational net assessment (ONA)
 - Provides data collection and ONA analytical support
- **USCENTCOM**
 - Provides assistance in expanding the CIP Program
 - Enhances its FP Program and supported Integrated Base Defense (IBD) initiative to successfully accomplish its warfighting mission.
- **USPACOM**
 - Provides technical expertise in IA/DIO policy and operations, DIO systems engineering, and Joint Experimentation Program support
 - Develops IA integration of the Coalition Deployment Planner (CDP)

Joint IED Defeat Office Support



DDR&E EXECUTION PERFORMANCE TRACKING SYSTEM



JIEDDO - EXECUTION PERFORMANCE TRACKING SYSTEM

HOME

TRACKING

HISTORY & MISSION

The JIEDDO was created on February 14, 2006 by [DoD Directive 2000.19E](#).

It's mission is to focus (lead, advocate, coordinate) all Department of Defense actions in support of the Combatant Commanders' and their respective Joint Task Forces' efforts to defeat Improvised Explosive Devices as weapons of strategic influence.

LINKS

[2006 IED Defeat Seminar AT&L](#)
[Defense Link](#)
[DDR&E](#)

JIEDDO DIRECTOR RESPONSIBILITIES

Serve as the DoD point of coordination and catalyst for initiatives across the full range of efforts necessary to defeat the IED threat.

Serve as the principal advisor to the Deputy Secretary of Defense and the principal advisor to the Chairman of the Joint Chiefs of Staff on IED Defeat matters.

Integrate all IED Defeat solutions throughout the Department of Defense, seeking Interagency assistance, as necessary, and identifying innovative near-term solutions.

Coordinate with other DoD Components for ongoing mid-term research and development initiatives and long-term science and technology efforts.

Approve Joint IED Defeat initiatives valued up to \$25 million.

Identify specific timelines and DoD Component leads to sponsor, coordinate,

LEADERSHIP

The responsibilities and functions related to the JIEDDO are allocated across many organizations and offices within DoD, including OSD, USD(I), USD(P),

ORGANIZATION

The JIEDDO is a joint entity and a jointly manned activity of the Department of Defense, operating under the authority, direction, and control of the Deputy Secretary of Defense.

JIEDDO has six boards:
JIEDD Senior Resource Steering Group (SRSg)
JIEDD Integrated Process Team (JIPT),
JIEDD Systems Integration Board (JSIB)
JIEDD Resource and



JIEDDO- Harnessing technological advancements today to support the warfighter now and into the future.

JIEDDO uses this tool to collect Obligation expenditure amounts, and status descriptions relating to funding, milestones, deliverables, performers, etc) for efforts funded by the Quick Reaction Special Projects program (including the Rapid Reaction Fund (RRF))

Combating Terrorism Technology Task Force Support



Combating Terrorism Technology Task Force *Meeting Warfighter Needs*

[Logout](#)

[Home](#)

[Overview](#)

[Projects](#)

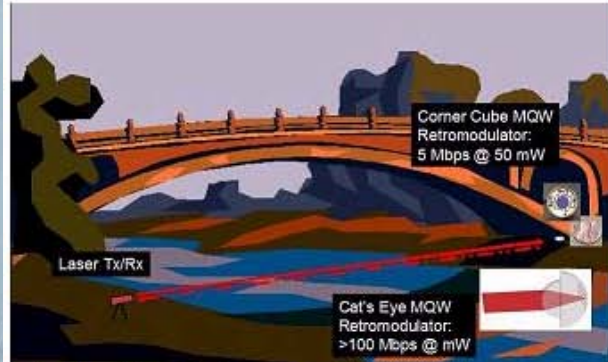
[Calendar](#)

[CTTF Staff](#)

CTTF Portal Updates

Welcome to the Combating Terrorism Task Force (CTTF) Portal. This section will contain information on the latest updates the CTTF portal. Thank you for visiting.

Spotlight on CTTF Success



Retro-Modulators for Free Space Data Retrieval

Asymmetric data link is retro-modulator based. The modulating retroreflector (MRR) is coupled with a sensor and is very small (cm), lightweight (ounces) and requires milliwatts of power to support data rates of megabits per second over carriers not susceptible to rf interference. Transmit/receive unit is remotely located and is transportable. Unit can be deployed easily in the field and can support kilometer-level ranges.

DefenseLink Top News



STANDING GUARD – U.S. Army Spc. Jason Raymond stands guard in a tower draped with camouflage netting at Forward Operations Base Taji in Iraq, March 19, 2006. Defense Dept. photo by U.S. Navy Petty Officer 1st Class Michael Larson [Hi-Res Photo](#) | [Lead Photo Archive](#)

Bush: Iraq Reaches Historic Moment

WASHINGTON, March 21, 2006 – Sectarian violence that erupted after the Feb. 22 bombing of a mosque in Samarra, Iraq, could have led to civil war. But Iraqis stayed united and are working to build a united government, President Bush said here today. [Story](#)

• [Supporting Troops Helps Promote Freedom](#)

Cheney Thanks Airmen for Terror War Support

SCOTT AIR FORCE BASE, Ill., March 21, 2006 – Vice President Richard B. Cheney visited the U.S. military's transportation hub here today to thank U.S. troops for their support in the global war on terror and assure them that the country won't abandon Iraq before the mission is completed. [Story](#) | [Remarks](#)



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[DoD TechMatch](#)
[Military Critical Technologies List](#)
[Office of Naval Research](#)
[OUSD \(AT&L\)](#)
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ATEP Alerts

Alerts: Month Year GO

There are no Alerts

ATEP Announcements

Announcements: Month Year GO

Date	Time	Subject	Summary
12/07/2004		2005 DOD ANTITERRORISM (AT) AWARD PROGRAM	THIS MESSAGE PROVIDES THE NOMINATION CRITERIA FOR ...

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Getting Started...

Here are a few pointers to get you started:

- A more complete guide can be found under Help on the menu
- You can minimize a portlet to a title bar by clicking the bar on the right top.
- You can delete a portlet by clicking the X
- A portlet can be moved by drag-and-drop to a new position on the page
- Clicking a pencil allows you to edit the portlet information.
- When entering a web link in to a links portlet, be sure to use http:// before entering the web address.
- Any changes you make will be remembered as your preferences.

Early Bird: Current News.

A daily (duty days) concise compilation of the most current published news articles and commentary concerning the most significant defense and defense-related national security issues. Available by 0515 hrs. [\[click on a date to view\]](#)

Mon	Tue	Wed	Thu	Fri	Sat	Sun
Jan 03	Jan 04	Jan 05	Jan 06	Jan 07	Jan 08	Jan 09
Jan 10	Jan 11	Jan 12	Jan 13	Jan 14	Jan 15	Jan 16

ATEP Discussions

	Forum (1-1 of 1)	Msgs	Last Post
	General ATEP Discussion	2	1/6/2005 10:25 AM

Technical Information Matters



- The rate of change of technology and the volume of global technology information are increasing
- Because of this, the risk of technology surprise is also increasing
- Efficient access to accurate technical information is vital to ensuring the DoD RDT&E program is responsive to future threats
- The R&E Portal is the information support solution of choice for the DoD RDT&E community



A Couple of Examples

- It took 45 seconds to find out NAWCAD (Patuxent River) is conducting research and has ground tested impact of types of eye goggles for protection from lasers on F-18E/F cockpit—including name of researcher.
- It took 30 seconds to find out the Army (Soldier Systems Command) is developing a precision air drop capability—and gave name and e-mail of POC
- It took three passes, and question refinement to identify a POC at Hq Army who is working on vehicle blast protection.
- Each example over simplified, but, the portal allowed us to find a good POC and information locally to refine follow-up actions

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30 Years Ago DoD S&T Developed Technologies That Changed Warfighting



- Disruptive technologies resulting from technology push:

- Internet
- GPS
- Night vision
- Lasers
- Stealth
- Predator
- Global Hawk

All provided
dominant
capability

- None of these emerged from requirements

Stealth



UAVs



GPS

**Advanced Optics
and Lasers**



Night Vision



Current DoD Capability Advantages Are 20-25 Years Old

Disruptive Technologies

Frequently Take a Forcing Function



Technology	Approximate Date Of First Lab Demo	Approximate Date of First Military Applications	
Radio	1901	1914	} World War I
Airplane	1903	1916	
Vacuum Tube	1906	1915	
Mechanized Tank	1916	1916	
Liquid-Fueled Rockets	1922	1944	} World War II
Radar	1925	1939	
Gas Turbine	1935	1944	
Digital Computer	1943	1945	
Ballistic Missile	1944	1945	
Nuclear Weapons	1945	1945	
Transistor	1948	1957	} Cold War
Inertial Navigation	1950	1955	
Nuclear Propulsion	1950	1954	
Artificial Earth Satellites	1957	1960	
Integrated Circuit	1960	1970	
Laser	1961	1967	
Precision Weapons	1965	1967	

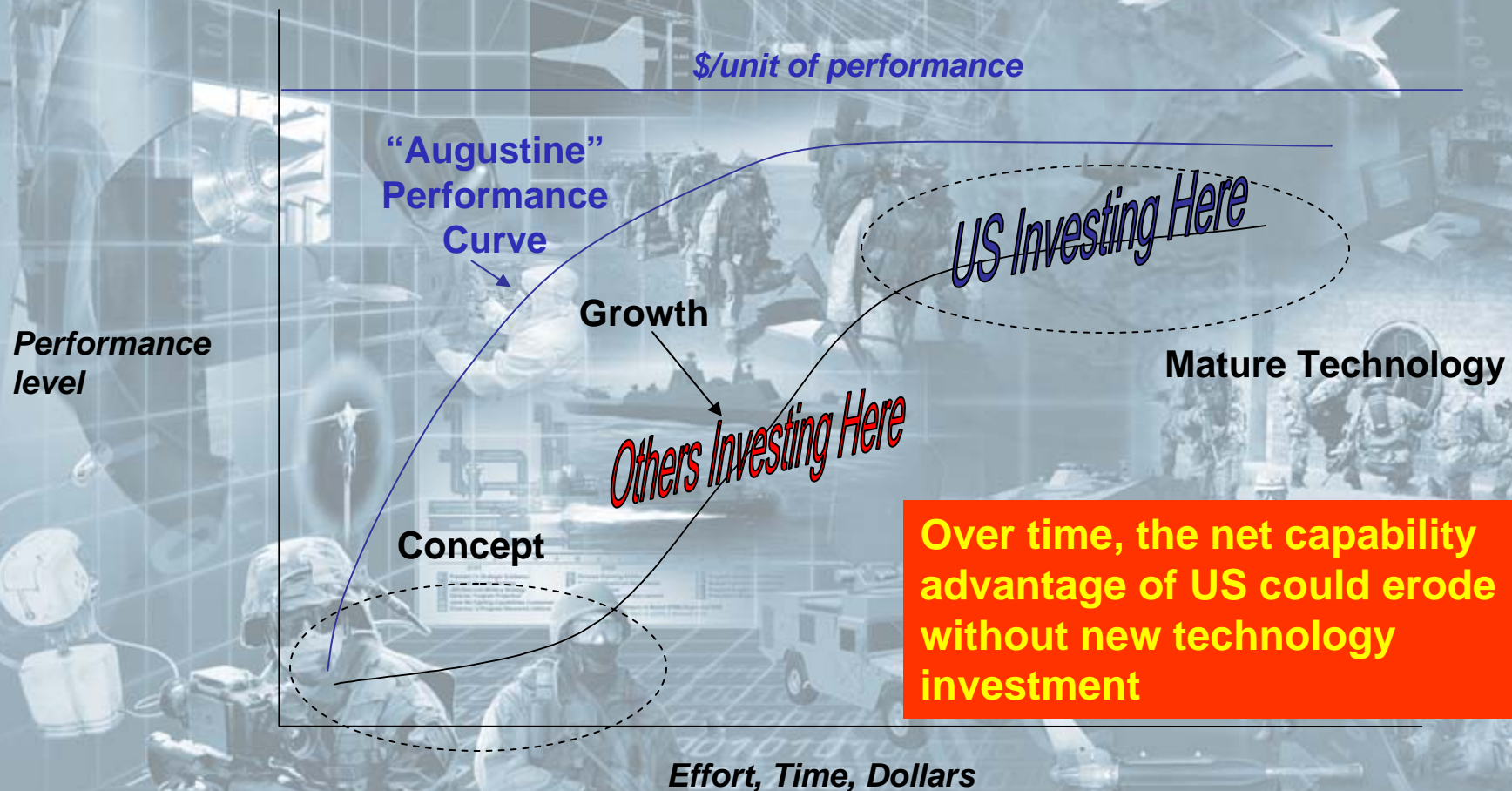
One function of S&T – Keep the pantry stocked

Diminishing Return?

Technology S-Curve



Most Technology Maturation Follows S-curve:
Initial Discovery, “Productization”, then Incremental Improvement



Changing Security Environment - Four Challenges -



VULNERABILITY

Irregular

- Unconventional methods adopted by non-state and state actors to counter stronger state opponents.
- (e.g., terrorism, insurgency, civil war, and emerging concepts)

Catastrophic

- Acquisition, possession, and use of WMD or methods producing WMD-like effects against vulnerable, high-profile targets by terrorists and rogue states.
- (e.g., homeland missile attack, proliferation from a state to a non-state actor, devastating WMD attack on ally)

Traditional

- Military capabilities and military forces in long-established, well-known forms of military competition and conflict.
- (e.g., conventional air, sea, land forces, and nuclear forces of established nuclear powers)

Disruptive

- International competitors developing and possessing breakthrough technological capabilities intended to supplant U.S. advantages in particular operational domains.
- (e.g., sensors, information, bio or cyber war, ultra miniaturization, space, directed-energy, etc)

LIKELIHOOD

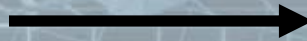
Uncertainty is the defining characteristic of today's strategic environment

Definition of Disruptive Technology

Some Historical Examples--Commercial

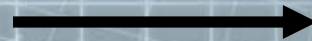


Candle



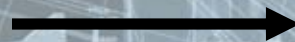
Electric Light

Vacuum Tubes



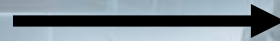
Transistors

Mechanical Watches

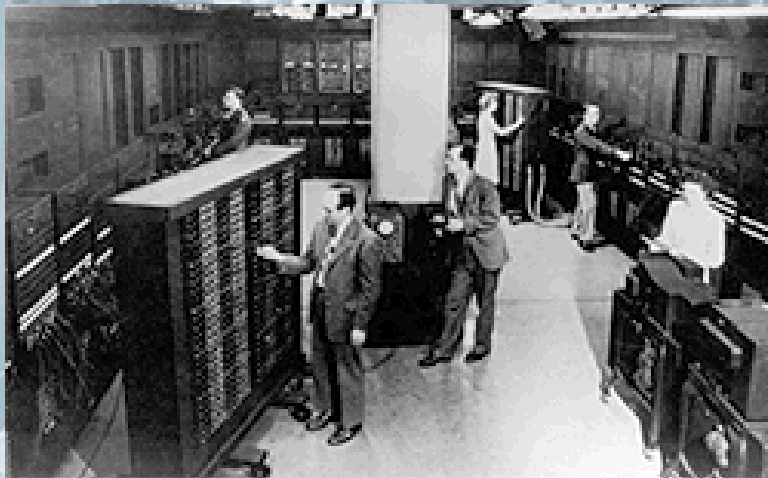


Quartz Watches

Mainframe Computers



Personal Computers



In each case, the Disruptive Technology decimated the conventional market - in a very short time